

The

CHEMIST

July, 1961



DR. L. T. EBY, F.A.I.C., (left) accepting the Honor Scroll of the New Jersey AIC Chapter from Dr. J. H. Mahoney, Chapter Chairman.

(See Page 241)

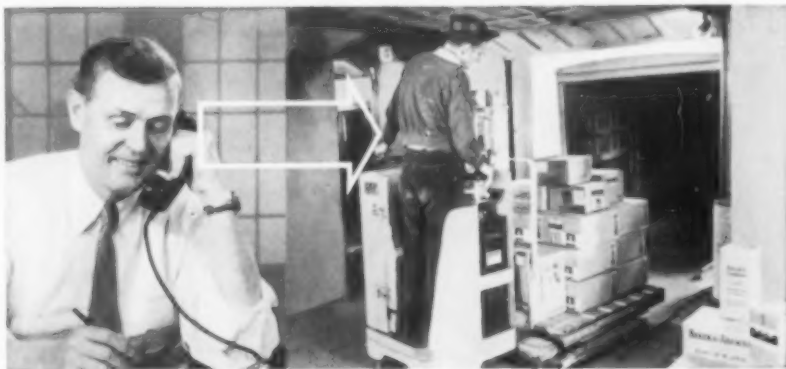
Volume XXXVIII



Number 7

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Deadlines for THE CHEMIST: For the August issue the deadline is July 15.

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To Come in August

"The Impact of the Federal Scientific Research Program on Technological Progress," by the Hon. Richard S. Morse, Assistant Secretary of the Army (R&D), postponed for reasons of space, will be featured . . . "Scientific Information—Future Prospects" is the acceptance address of James W. Perry when he received Hon. AIC membership, April 22 . . . The new AIC Committees and what they do will be announced.

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Report on the First 100 Replies to the Preferred Course Questionnaire

Dr. D. B. Keyes, F.A.I.C.

480 Park Ave., New York 22, N. Y.

REFERRING to the Questionnaire published in the April issue of THE CHEMIST, we now can report that there is no change in the course averages. In brief, the "100" indicate that the best curriculum for the college student who desires a basic foundation for a successful career in the chemical industry is as follows:

1. *Chemistry*—11 semesters (accent on Organic and Physical)
2. *Physics*—5 semesters
3. *Mathematics*—4 semesters (accent on Calculus)
4. *English*—4 semesters (accent on Composition)

5. *Foreign Languages*—4 semesters (accent on German & Russian)

6. *Chemical Engineering*—3 semesters (accent on Principles)

7. *Economics*—1 semester (accent on General)

8. *Thesis*—1 semester (accent on Chemistry)

9. *Business Management*—1 semester

10. *Other Engineering Subjects & Appreciation*—Music, etc.

(1 semester between them)

12. *Miscellaneous* — 4 semesters (accent on: Psychology, Philosophy, Biology, Bacteriology, American and European History)

Special AIC Announcements

New York Chapter Officers

The New York Chapter has elected the following officers for the 1961-62 fiscal year:

Chairman, Dr. Kurt S. Konigsbacher, Evans Research & Development Corp., 250 E. 43rd St., New York 17, N. Y.

Chairman-elect, Dr. Pauline Newman, Food Machinery & Chemical Corp., 161 E. 42nd St., New York 17, N. Y.

Secretary, Miss Mildred Hunt, Sugar Research Foundation, 52 Wall St., New York 5, N. Y.

Treasurer, Edwin A. Wynne, 272 First Ave., New York 9, N. Y.

Representative to National Council, Dr. John L. Hickson, Sugar Research Foundation, 52 Wall St., New York 5, N. Y.

Federal Regulation of Animal Experimentation

The National AIC Council, at its meeting June 5, 1961, went on record as opposed to any bill that regulates the use of animals in legitimate experimental work.

To All Councilors

The next meeting of the National Council will be held on Monday, September 25, 1961, at The Chemists' Club, New York, N. Y. The Board will meet at 5:00 p.m., the Council at 5:30.

Group Insurance

The New York and New Jersey Chapters make available to their members group insurance covered by the Insurance Company of North America, and reports indicate that the claim service rendered has been very satisfactory. The company has now increased the limits of the coverage available to \$150 weekly indemnity; \$25,000 for accidental death and dismemberment; \$20 a day hospital benefits, and \$300 for surgical benefits. Inquiries should be directed to the Administrator of the Plan, Walter Strauss, C.L.U., 67 W. 44th St., New York 36, N. Y. (Phone: MU 7-4744 or -4749).

1962 Annual Meeting

The 39th AIC Annual Meeting will be held May 10-11, 1962, at the Edgewater Beach Hotel, Chicago, Ill., with the Chicago AIC Chapter as host. H. F. Schwarz, Sherwin-Williams Company, 116th St. and Champlain Ave., Chicago 28, Ill., will be chairman of the General Arrangements Committee for this 1962 Annual Meeting.

AIC Lapel Buttons

Gold and green-enamel lapel buttons bearing the insignia of the AIC are available from the Office of the Secretary, The American Institute of Chemists, 60 E. 42nd St., New York 17, N. Y., for \$1.50 each, or they may be purchased from AIC Chapter Secretaries, who are offered

a special arrangement for handling these.

Lest We Forget

The distinctive insignia of the AIC incorporates an alchemical symbol meaning, "The Essential Thing" within a circle symbolizing, "all-embracing." It portrays the importance of the profession to achievement in chemistry and chemical engineering. The designer of the emblem was the late Dr. D. D. Berolzheimer, F.A.I.C.

Patent Query

Readers of THE CHEMIST are invited to fill out the short questionnaire on page 276. Information about patents, presented at the 38th Annual Meeting, will be found on pages 255-275.

The Fifth Annual Symposium on Advances in Tracer Methodology, sponsored by New England Nuclear Corp., 575 Albany St., Boston 18, Mass., will be held at the Shoreham Hotel, Washington, D.C., Oct. 20, 1961.

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Technical Skill Plus Human Relations Brings Professional Status

Dr. Lawrence T. Eby, F.A.I.C.

Assistant Manager, Market Development Div., Enjay Chemical Co., Elizabeth, N. J.

(Presented when the author received the Honor Scroll of the New Jersey AIC Chapter, at Newark, N. J., April 19, 1961).

IT is no secret and it should astonish no one in our profession that the chemist is little understood by the public. Even to stand before an audience of chemists and to expound the details of a research subject close to my heart would dissatisfy most of them. The paradox of our profession is that progress is made through a high degree of specialization, each facet of which is of interest and has significant meaning to only a small group of chemists.

It is a rare individual who can specialize in science and communicate his specialty to the public. As a matter of fact, it is almost impossible to contribute in both directions at the same time, unless the results affect the public directly, as perhaps an explosion or a cranberry scare. In many cases industry stands between the contributions of our profession and the public, since new products, such as a new drug, are recognized by the company label rather than by the inventor.

The most recent study by Beardslee and O'Dowd (*Science*, 133, 997, Mar. 31, 1961) confirms earlier surveys that scientists are seen as intelligent and hard-working people but also as uncultured and not interested in other people. C. P. Snow has argued that indeed scientists are less interested than most educated men in esthetic and social affairs. He also argued that an improvement could take place in the general appreciation of the demands that the scientific mode of thought makes upon anyone.

This is all to make you feel somewhat more secure and to encourage you to continue in your specializations, work diligently toward your scientific goals, remember that you are being observed; people are waiting for the fruits of your labor even though they do not understand how the fruit is grown. They have had a taste of these fruits to such an extent that they would suffer horribly if they were taken away.

Professionalism is so intimately related to human relations and opinions that it is purely subjective in its existence and its relative position. It is as the public, or those with whom you come in close contact, appreciate the human skill and effort required to accomplish scientific achievements that your profession is recognized.

As each of us takes an interest in recognizing the accomplishments of

others in chemistry, we are helping our profession. As we help our neighbor to remove some weeds with a new chemical spray and explain its development as best we can, we are helping our profession. Many public relations efforts sponsored by industry have been helpful to awaken the public to the contributions of the chemist. These are often much beyond that which could be done by our professional societies. It is with awareness toward human relations and patience for results that is leading toward improvements in the profession of chemistry—the objective of THE AMERICAN INSTITUTE OF CHEMISTS.

I would like to emphasize two vital characteristics necessary to advance our profession. First is the preparation which comes with years of unending study, observation, and application to attain the skill and experience required to make valuable contributions to the employer, whoever he may be. Second is the faith and confidence to proceed into new areas of knowledge. More often than not this must be accomplished in the face of objection. It is often the skill, patience, and perseverance with which this is done that elevates the relative position of the professional. Obviously, the dual role of technical skill and human relations have a complex but all important interaction. None of us attains perfection, but we may strive toward it.

Lawrence Eby -- Professional Chemist

Dr. D. L. Cottle, F.A.I.C.

Esso Research & Engineering Co., Elizabeth, N. J.

(Presented when Dr. Eby received the Honor Scroll of the New Jersey AIC Chapter)

DR. LAWRENCE T. EBY'S professional career was launched during World War II at Esso Research, where he arrived equipped with a B.S. in chemical engineering and a doctorate in organic chemistry, a tremendous amount of energy, more than the usual ability and a great concern for his fellow man. As a chemist he has collaborated on articles on pure organic chemistry, laboratory equipment and analytical procedures. He is an authority on the carcinogenic properties of petroleum products. His contributions to the patent literature are on sulfur-containing organic compounds, olefins, synthetic lubes, modified butyls, additives for Diesel fuels, lubricants, and synthetic rubbers, and the reduction of carcinogenicity of high boiling petroleum products.

Larry has contributed more than knowledge to his profession. He has contributed as largely to the profession itself. At one time he was best

known for his chairmanship of membership committees of both the North Jersey section of the ACS and the New Jersey Chapter of the AIC. If chemists do not belong to both organizations it is not his fault. For the North Jersey Section, ACS, he has served on numerous committees, has chairmanned committees, served as delegate to the Technical Societies Council, spearheaded the organization of the Central Subsection of which he was later chairman, has served as secretary and is now the chairman of the large confederacy known as the North Jersey Section, ACS. His record with the AIC is equally impressive. He was publicity chairman for the 1954 Annual Meeting, has been a national councilor and has served as chairman of the Qualifications and Chapter Activity Committees. He was chairman of the New Jersey AIC Chapter in 1958-59.

It was at about this time that he became again an engineer, at least in title, when he joined the Enjay Company. He is now assistant manager of its Market Development Division.

The ideal chemist also shares in civic activities, thus reflecting credit on his profession. In his community, Dr. Eby was chairman of the Mental Health Committee. He has taught senior high boys in Sunday School ever since graduate school days. He was general superintendent of the Sunday School, and when it burned, he so managed that they came out of the disaster period with a larger school than before the fire. He has been an ordained Elder of the First Presbyterian Church since his late 20's, and is president of its board of trustees. One gets the distinct impression that an occasional project around the house has suffered but that when these projects concern his two daughters this is not so. The picture I would leave with you is that of a man devoted to his family, to the affairs of his profession, and to the community.

(For the presentation of the Honor Scroll to Dr. Eby, see page 252)

The XII International Astronautical Congress will be held Oct. 2-7, 1961, in Washington, D.C. For information, Prof. Samuel Herrick, chairman of the Congress, University of California, Los Angeles 24, Calif.

Atlas Powder Company, Wilmington 99, Del., has changed its name to Atlas Chemical Industries, Inc.

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Report from the Committee on Legislation

The Drug Industry Antitrust Act

Senator Estes Kefauver (D-Tenn.) has introduced a bill, S.1552, called the Drug Industry Antitrust Act. This bill, if enacted, would go a long way toward destroying the patent system. In addition it would bring about major, unwholesome changes in anti-trust laws and the Federal Food, Drug & Cosmetic Act.

Among other things, the bill would give to the Secretary of Health, Education and Welfare, as well as the Commissioner of Patents, authority to determine the patentability of a drug application. It would establish compulsory licensing of drug patents, at a specified royalty limit, after three years. It would require drugs to be proven "safe" and "efficacious" before approval would be given by FDA. It would make certain settlements of interference proceedings unlawful *per se* as restraint of trade.

Hearings on this bill are tentatively scheduled for July. The Committee on Legislation recommends opposition to this bill. AIC members are urged to express their opinions to their Congressmen or present statements to members of the Senate Committee on Judiciary. Copies of S.1552 and the membership of the Judiciary Committee may be obtained from the AIC Committee on Legislation.

Federal Controls Increasing

Secretary Freeman, former Democratic Governor of Minnesota, is vigorously pursuing the "Supply Management" program for agriculture. Briefly stated, this program envisages the Federal government controlling and directing every phase of agricultural production and marketing, up to the very time when the food and fiber is processed for sale to the public.

—*Human Events*

In discussing the Kennedy-Freeman Farm Program, the Administration is tackling many of its problems with the objective of increasing Federal government control. This is also apparent in the scientific field and the chemist and chemical engineer should be alert to the trend and the increasing types of Federal control.

The Optical Society of America will publish a new scientific journal to be called *Applied Optics*, to be issued bimonthly beginning next January. The journal will be distributed by the American Institute of Physics, 335 E. 45th St., New York 17, N. Y.

The 40th Norelco X-ray Analytical School will be held at the Sir Francis Drake Hotel, San Francisco, Calif., September 11-15, 1961. For information: Philips Electronic Instruments, 950 So. Fulton Ave., Mt. Vernon, N. Y.

The Ten Most Wanted Chemists

Dr. B. R. Stanerson, F.A.I.C.

Deputy Executive Secretary, American Chemical Society

(Presented at the 38th Annual Meeting of the AIC, in Washington, D.C., May 12, 1961).

AN analysis of the manpower situation, in other words a summary of the present supply and demand picture for chemists, some ideas about the prospects for the future, and comments on what is being done to improve certain aspects of manpower matters, was the suggested topic for discussion. By giving you some idea about the "Most Wanted Chemists," I will cover the present supply-demand picture. As for the future, this will be done in a philosophical manner because it cannot be done quantitatively. Finally, I shall discuss the part being played by professional societies and some other groups in meeting the problems of the times.

One of my early assignments after joining the ACS staff was to study the temporary oversupply of graduates in late 1949 and early 1950. We believed that we might be able to estimate whether or not this oversupply would last for one, three, five or ten years. It was my impression then that this would be really a simple problem of accounting. Surely there were figures either available or obtainable which would tell me the number of chemists on the market and estimates of the number to be produced in the years ahead. The only remaining part of the project would be to survey the users of chemists to determine the number of chemists they expected to hire one, three, five, and ten years ahead. I conceded that the farther into the future we projected our figures, the more inaccurate our studies would be.

How naive can one be? I soon found out that such things as technological breakthroughs, economic recessions, hot and cold wars, federal support of research, and massive government projects can change the supply and demand picture literally over night. We know of both industrial and government personnel men who have spent months preparing to recruit a certain number of chemists only to have plans changed at the last minute! Sometimes the figures are modified upward, sometimes lowered. There seems to be no such thing as a steady state in personnel recruiting. Therefore, most efforts to measure with accuracy the long-range demand for technical personnel is mainly a mental exercise. In spite of this, we can reach certain forecasts qualitative in nature, and I shall make my own prediction later.

In the ACS program are several built-in procedures which give us an idea of the current supply and demand for our members. One of these is

Chemical & Engineering News and the ads it carries. The most recent C&EN contains 153 column inches of "Situations Open" ads and 34 column inches of "Situations Wanted" ads. From this crude barometer it appears that there is a strong demand for chemists this week. With some variation this has been the picture for the past 20 years.

Frequently I find myself amused and sympathetic with the situation pictured in the cartoon, "Born Thirty Years Too Soon." Just thirty years ago, I was about to get my master's degree and, luckily, a job. The May 10, 1931, issue of the "News Edition," contained 5 column inches of "Positions Open" and 38 column inches of "Positions Wanted" ads. For every job advertised there were at least eight chemists ready to step in.

Another barometer available to the ACS is its Employment Clearing House operated at National Meetings of the Society each Spring and Fall. There was a strong demand for chemists and chemical engineers in New York last September, as evidenced by the 1080 employer representatives in attendance and only 464 applicants for positions. We arranged 7327 interviews between these people in a four day period. It seems to me that the number of interviews one receives in a given time is a measure of the demand for that specific person. I studied the qualifications of those who were interviewed most in New York last September and found the following:

Most Wanted Chemists

NECH — September, 1960

Field:	Physical	Organic	Analytical
Age:	31	32	28
College Training:			
B.S.	Small to medium sized college		
Ph.D.	Well established university		*
Experience:			
Summer	yes	—	Yes
Industry	4 years	4 years	Little
Teaching	—	—	Yes
Publications:	4	5	1-2
Interviews/day	17.3	15.3	15.2

*Graduate work preferred but Ph.D. not required.

In addition to data shown above, all applicants were males, most were unmarried, those employed were in research, none listed patents. Also, with one exception who received his undergraduate training at a foreign university, all were graduates of ACS approved schools.

The same procedure of rating the most wanted chemists was followed at the recent ACS Meeting in St. Louis. There we had 296 applicants and 616 employers and arranged 3583 interviews. The average number of

THE TEN MOST WANTED CHEMISTS

interviews per registrant, 12.1, was a bit lower than in New York indicating that the market is not as strong as it was six months ago. It still is not bad, however. In St. Louis the profile of the most wanted chemists based on interview frequency was:

Most Wanted Chemists

NECH — March, 1961

Field:		Organic	Physical-Inorganic
Age:		30	34
College Training:	B.S.	Variety of colleges	
	Ph.D.	Variety of universities	
	Summer	Relatively little recorded	
Experience:	Industry	1 + year	6 years
	Teaching	Graduate assistantships	
Publications:		2 +	4
Interviews/day		12 +	14

Research chemists obviously are in greatest demand at our National Employment Clearing Houses. Practically all of those interviewed extensively had Ph.D. degrees. Industry, however, has a strong demand for non-research chemists also. I asked a number of personnel men what they were looking for currently in non-research manpower and received the following answer:

Most Wanted Chemist Non-Research Position

Training: Bachelor's degree with some graduate work.

Experience: One to five years in industry.

Publications: Scientific publications not a must but writing desirable. Patents a big asset.

Other qualities: Business and "patent" sense, leadership, ability to work in team, "good" personality.

Thus far the discussion has emphasized the needs of industry, since more than 2 out of 3 chemists are employed in industry. We must not overlook other employment opportunities, particularly the demands of governmental and academic institutions. It appears that Government demands are much more comparable to those of educational institutions than of industry. Government's most wanted chemist is certainly a Ph.D., preferably one with a year of post doctoral training. Also, it would be well for this person to have 2 or 3 years of industrial experience. The Government is not different from others in wanting a person with "good mental and physical make-up, and a combination of the subjective character traits and work attitudes, adaptability, etc., that with experience will develop into a successful chemist with potential to develop a reputation in the field and to grow with the organization."

For ages it has been common practice for college and university department heads to contact other department heads with the query, "Who is your standout chemist graduating next Spring? We are looking for a person to replace Professor A who will retire then." To get an idea of what department heads are looking for when they ask this question, I wrote to several to get the following profile of this most wanted chemistry professor.

**Most Wanted Chemist
Ph.D. Granting Institutions**

Training: Doctorate at a "leading" university, post doctoral training at a "gold plated" university.

Field: Depends upon vacancy.

Publications: Quality of major consideration, quantity next.

Experience: Some teaching experience highly desirable.

Other qualities: Originality, personality, speaking ability, ability to work independently and present research effectively.

I also contacted department heads of an equal number of institutions which do not grant the Ph.D. degree. Their demands were slightly different, especially with respect to post doctoral training. Without exception the department heads at Ph.D. granting institutions emphasized the desirability of at least one year and preferably two years of post doctoral training. Only one of those at non-Ph.D. granting institutions mentioned the need of such training. This difference is logical because of the difference in emphasis on research work in the two types of institutions. The non-Ph.D. granting institutions were most insistent that the person they hired do an inspiring job of teaching.

I have said nothing specific about the demand for women in chemistry. Actually, in my "horse back" survey to determine the ten most wanted chemists I was unbiased and said nothing about sex. As a result, few indicated whether they were seeking men or women. In some cases one could interpret the data to be applicable to either. However, in every case where the information was volunteered, the male chemist was the "most wanted."

Some 5-10% of the chemists in this country are women. Actually, there is a rather strong demand for them. However, there is no use denying that there is some prejudice against women chemists for certain kinds of positions. In spite of this, there are many successful women chemists. It seems evident that the woman who can produce more research in less time than her male counterpart is practically assured of a modicum of success. In doing so, however, she must be careful not to ascend to an administrative position in which she will "direct" men chemists!

THE TEN MOST WANTED CHEMISTS

What are we doing to produce more people of the caliber of the "Ten Most Wanted Chemists." An inherent part of this question, although not often stated, is "What are we doing to prevent people from entering the profession who in all probability will not be successful?" Many are convinced that there are plenty of chemists available today if they possessed a majority of the traits of the most wanted. There is a great deal being done to improve the caliber of chemists. Efforts start at an early age and continue right on through one's working career. A few projects of significance are:

Elementary and Junior High School: Here the main emphasis is on career guidance, laying a sound foundation in science, and creating an atmosphere for the study of science. The Manufacturing Chemists' Association, the National Science Teachers Association, the ACS, numerous universities, other organizations, often with the aid of Government grants, have prepared excellent career information. Also, there are numerous efforts to improve the elementary and junior high school science curriculum. The main objective is to develop a logical and continuous learning process in science, preferably under teachers who are not frightened at the thought of science.

High School: There are many projects to improve high school science. Because of their significance, however, I call special attention to certain curriculum studies in chemistry. One is the "Chemical Bond Approach" with Dr. Laurence Strong of Earlham College as project director. The other, with Dr. J. A. Campbell of Harvey Mudd College as project director, is the Chemical Education Materials Study Group. The titles indicate the nature of these new approaches to the study of chemistry. Also, the *Encyclopaedia Britannica* Film series and the Continental Classroom TV course in Modern Chemistry are examples of efforts to bring a conventional course in chemistry up to date.

College: The "Ten Most Wanted Chemists" were invariably graduates of ACS approved departments of chemistry. This speaks adequately for the Society's part in upgrading college work in chemistry through the program of its Committee on Professional Training.

University: The importance of advanced fundamental research in producing the kind of scientists most needed is being realized more each year. Great efforts are being made to provide the best of opportunities at the university level. The emphasis of the Government is expressed by the millions of dollars expended in recent years. Industry does its part through numerous and liberal fellowships. The American Chemical Society

administers the proceeds of the Petroleum Research Fund, which provides about \$3,000,000 annually for advanced scientific education and fundamental research in the "petroleum field." This assists many graduate students and post doctoral fellows to qualify for positions of great responsibility.

Post-Graduate Experience: The one thing which will perhaps keep a chemist in the "most wanted" category longest is for him to realize that his education will never end as long as he professes to be a chemist. He must continue to improve his scientific and professional training to keep pace with rapidly changing developments. It is in this respect that organizations such as the AIC and ACS can be helpful. Through their publications and activities, particularly at the local level, they can provide not only continuation courses and other training experiences, but by cooperative efforts they can encourage those who need help most to participate in these projects.

While I have not actually identified the "Ten Most Wanted Chemists," certain characteristics of chemists in considerable demand have been identified. From this we may conclude that:

(1) There is a good demand for chemists today, particularly for those with a doctor's degree and even more so for those with post doctoral training.

(2) The amount of training required of chemists is increasing significantly; post doctoral training is now almost a "must" for one who expects to get on the staff of a well established university.

(3) Not only the amount of training but also the type of required training is changing. The need for training in fundamental principles and approaches to research problems is ever so much more important than emphasis on vocational training. This has become apparent because of the rapid change in needed skills during the past two decades. Peter F. Drucker in his book, *Landmarks of Tomorrow*, says:

Since we live in an age of innovation, a practical education must prepare a man for work that does not yet exist and cannot yet be clearly defined. He must acquire basic tools of analysis, of expression, of understanding.

(4) Where a person obtains his academic training has considerable influence on the demand for that person.

(5) Personality characteristics are often the difference between a person being classified as one of the "Ten Most Wanted Chemists" and one of the "Should we make him an offer?" type.

(6) Because the supply and demand picture for chemists changes on relatively short notice, due to such factors as technological breakthroughs, economic recessions, world tensions, and federal policy, it is impractical to

THE TEN MOST WANTED CHEMISTS

predict with precision what the labor market for chemists will be at any given time in the future. However, if you will allow me the latitude of predicting the average supply-demand picture for a year's duration at some time in the future, I would say that it would be "Good" to "Very Good." I mean "Good" from the viewpoint of the employed chemist. Perhaps some employers would look at the situation differently.

Why do I feel so confident? Simply because all the signs of the times point toward greater technological advances for the future. There can be no technological advance worth mentioning which does not either directly or indirectly involve chemists. Therefore, it is obvious that more and more chemists will be needed. It also seems obvious that the nearer they are to the characteristics of the "Ten Most Wanted Chemists," that is, highly educated and imaginative people, the greater will be our accomplishments in the United States.

Chemists are by no means the only people in demand. By changing the word "chemist" to any of a variety of intellectual people, this paper might be suitable for other audiences. The future of chemistry and all comparable groups was summarized very cogently in a recent *Fortune* article, which stated:

Tomorrow requires something that the world has never seen—
masses of intellectuals.

At the dedication of the Olin Research Center at New Haven, Conn., March 20, Dr. William E. Hanford, Hon. AIC, vice president for research of Olin Mathieson Chemical Corp., reported that the company's metallurgical scientists have developed, through the pilot plant stage, a process for the purification of aluminum sulfate, "which puts us one step closer to having a commercially feasible process for producing alumina from clay."

There are some 600 scientists, engineers and technicians at the new \$7,500,000 Olin Research Center, where the company has concentrated its research on organic and inorganic

chemicals, fuels, propellants, explosives, packaging film, metals, firearms and ammunition.

The Anderson-Prichard Oil Corp., Oklahoma City 2, Okla., has changed its name to Apco Oil Corporation.

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"Should You Be a Chemist?" booklet for students. Career Information Service, N. Y. Life Insurance Co., Box 51, Madison Square Sta., New York 10, N. Y.

"The Pros and Cons of Compulsory Arbitration," a study prepared by Theodore H. Kheel, Esq. Request from N. Y. Chamber of Commerce, 65 Liberty St., New York 5, N. Y.

"What Price Professionalism?" Reprint from *Petroleum Refiner*, Feb. 1959. Query author John J. McKetta, chairman, Chemical Engineering Dept. University of Texas, Austin, Tex.

"Guide to U. S. Government Statistics." 3rd revised & enlarged edition. 1961. \$15.00 a copy (10% discount for cash orders). Order from Documents Index, Box 453, Arlington 10, Va.

New Jersey AIC Chapter Holds Awards Meeting

The 1961 Honor Scroll of the New Jersey AIC Chapter was awarded to Dr. Lawrence T. Eby, F.A.I.C., assistant manager, Market Development Division, Enjay Chemical Co., Elizabeth, N. J., at the Military Park Hotel, Newark, N. J., April 19, 1961. A social hour preceding the dinner was sponsored by Enjay Chemical Company.

Dr. D. L. Cottle, F.A.I.C., of Esso Research & Engineering Co., introduced Dr. Eby, to whom the Honor Scroll was presented by Dr. J. F. Mahoney, chairman of the Chapter. (See page 241).

Student Medal Awards were presented to outstanding seniors in colleges in the area. Those receiving these medals were:

Miss Cynthia Wentworth Cooke of Douglass College, sponsored by Dr. Lillian N. Ellis.

Miss Wendy Monica Robinson of Drew University, sponsored by Dr. Marvin S. Richards.

Edwin O. Eisen of Newark College of Engineering, sponsored by Prof. George C. Keefe.

Robert Edwards Thach of Princeton University, sponsored by Prof. Arthur V. Tobolsky.

Ernest F. Rutz of Rutgers, the State University, sponsored by Dr. Sidney Toby.

Patrick J. Cassidy of Saint Peter's College, sponsored by the Rev. George J. Hilsdorf, S.J.

Bernard Ream of Seton Hall University, sponsored by the Rev. Owen Garrigan.

The guest speaker was Irving Michelson, director of public service projects, Consumers Union, who spoke on "The Chemist's Ethics and the Community."

The citation on the Honor Scroll reads:

To Dr. Lawrence T. Eby

In recognition of his long and continuing interest in the professional and technical problems of the chemist and chemical engineer, which interest has been made manifest by the extensive time and devotion he has given to professional organizations of the scientist and engineer.

Dr. Roger Gilmont, F.A.I.C., president, announces the formation of a new company, Roger Gilmont Instruments, Inc., at 1 Great Neck Road, Great Neck, N. Y., for the purpose of developing instruments for the laboratory. Dr. Gilmont is also adjunct professor of chemical engineering at Polytechnic Institute of Brooklyn.

Joseph G. Curado, F.A.I.C., research director, Sun Chemical Corp., received, May 31, 1961, the Ault Award of the National Association Printing Ink Makers. Also in May, he received the Master Ink Technologist Award of the New York Printing Ink Production Club.

Dr. Herman F. Mark, F.A.I.C., director, Polymer Research Institute, Polytechnic Institute of Brooklyn, N. Y., received a Distinguished Service Medal from the State University College of Forestry, at Syracuse University, in April, "for penetrating discoveries in polymer chemistry."

Dr. Edward L. Kropa, F.A.I.C., chief chemical consultant of Battelle Memorial Institute, Columbus, Ohio, has been named chairman of the Committee on Textile Functional Finishing of the National Academy of Sciences-NRC.

Robert S. Kelly, F.A.I.C., is now with the Republic Aviation Corp., Materials Development Lab., Paul Moore Research & Development Center, Farmingdale, L. I., N. Y.

Prof. R. Norris Shreve, F.A.I.C., was awarded the honorary degree of Doctor of Engineering by Purdue University, June 4, in recognition of his lifetime work in chemical processing. Since 1930, he has been professor in the School of Chemical Engineering at Purdue. His foreign service has been extensive, he having investigated the chemical industry in Europe in 1928; in Japan in 1952; in the Philippines in 1955. Since 1952, he has been director of Purdue's aid to engineering education on the island of Formosa.

Dr. George F. Rugar, F.A.I.C., manager, Applications Research, Diamond Alkali Co., has been appointed to the newly created position of Washington representative of the company.

Dr. Ernest Csendes, F.A.I.C., has been appointed research director of Armour Agricultural Chemical Co., Hurt Building, Atlanta, Georgia.

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Physical Analytical Chemist, Grade 12, \$8955, to direct investigation for research methods for rapid detection of biological constituents of aerosols. Biochemistry desirable. **Biochemist**, Grade 12, plan, conduct, coordinate and evaluate basic and applied research in biochemistry as applied to biological problems. **Chemical Engineer**, Grade 11, \$7,560, serve as process engineer, studies associated with feasibility of large scale processing and design of specialized equipment, research on development of processes, etc., for producing uniform biological products. Apply Civilian Personnel Office, Fort Detrick, Frederick, Md.

Chemist, female. Some experience in chemical analysis desirable, but will consider June graduate. *Good Housekeeping Magazine*. Take typed resume. Personnel Office, Hearst Magazines, 309 West 56th St., N. Y. 19, N. Y.

Translator, technical, free-lance, home assignments, must type. State language, technical specialty, experience, rates. Box 71, THE CHEMIST.

Chemists Available

Research Supervisor. Organic Chemist, Ph.D. 1948. Organic synthesis, nitrogen chemistry, high-temperature reactions, petrochemicals and plastics. Successful supervisory and managerial experience. Desires responsible position in R & D, or in technical service or liaison work. Box 70, THE CHEMIST.

Chemist, F.A.I.C. Experienced in textiles, dyes, resins, polymers, coatings. Desires part-time, per diem on special projects. Resume supplied upon request. Box 72, THE CHEMIST.

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The 9th Detroit Anachem Conference will be held Oct. 16-18, 1961, at the McGregor Memorial Conference Center on the campus of Wayne State University, Detroit, Mich. At the Conference, **Dr. I. M. Kolthoff**, F.A.I.C., of the University of Minnesota will receive the Ninth Anachem Award.

Dr. Lewis F. Hatch, F.A.I.C., technical consultant, Enjay Co., Inc., Linden, N. J., is the author of *Isopropyl Alcohol*, just published by McGraw-Hill Book Co.

Nathan H. Nash, F.A.I.C., has been appointed director of new products development and marketing at Basic Foods, Inc., Englewood, N. J.

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Basic Features and Principles of the Patent Law

Edwin L. Reynolds

First Assistant Commissioner Designate, Patent Office,
U. S. Department of Commerce, Washington, D.C.

(Presented at the introduction to the tour of the Patent Office,
during the 38th AIC Annual Meeting, May 11, 1961).

THE purpose of the patent law, as stated in the Constitution, is to promote the progress of science and useful arts. The Constitution also prescribes how this may be accomplished; in its words, by securing for limited times to inventors the exclusive right to their inventions.

Our law provides patent protection for the inventor of any new and useful process, machine, manufacture, composition of matter, or improvement in any of these. The patentee is granted the right to exclude others from making, using or selling his invention for 17 years, and this gives him the opportunity to profit from his invention by utilizing it in his business to the exclusion of others, or by selling or licensing his patent rights.


There is one other basic fact. The law requires of every patentee, as a condition for grant of a patent on his invention, that he describe it in his patent specification in language that will enable any person skilled in the field of the invention to make and use it.

The patent law, functioning at its best, has the following beneficial effects: First, by holding out the hope of patent reward, it provides a psychological atmosphere and incentive which are conducive to the making of inventions. Second, the patent property value of a genuinely useful innovation attracts the capital necessary to develop it and get it on the market. Third, the teachings of the resulting issued patents provide, for any member of the public able to understand them, a library describing in great detail successive advances in every field of applied technology.

Ely Balgley, F.A.I.C., has been named director of the new market research department of A. E. Staley Manufacturing Company, Decatur, Ill.

O. T. Aepli, F.A.I.C., is now assistant technical director of the Magnus Products Corp., Detroit 12, Mich. He was formerly with Pennsalt Chemicals Corp., Wyandotte, Mich.

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The Patent Office Examining Operation

William B. Penn

Patent Examining Specialist and Secretary of Patent Office
Committee on Practice and Procedure

(Presented at the introduction to the Patent Office tour,
during the 38th AIC Annual Meeting, May 11, 1961).

THE Patent Office is charged with the duty of examining the subject matter of every patent application which it receives in accordance with the law, and of determining not only whether a patent should be granted, but also the scope of protection as determined by the breadth of the patent claims allowed.

To be patentable, the application must describe an innovation that can properly be characterized as an invention or discovery, and must satisfy a number of legally prescribed conditions as to novelty. The most important of these, from the standpoint of the examiner's task, is that a patent cannot properly be granted if the invention is patented or described in a printed publication in this or any foreign country before the applicant makes his invention or more than a year before he files his patent application.

The Patent Office is divided by subject matter into 70 examining divisions, each headed by a primary examiner and having an average of about 14 examiner assistants. The function of this organization is to make a search of prior patents and literature in the field of every patent application it receives, find out whether the claims of the application include features which are new, and make an official determination as to whether these features may properly be patented. Some considerable correspondence between the examiner and the applicant's attorney is usually required to provide a definitive conclusion of these issues.

To do his job effectively, the examiner needs effective bibliographic tools. These are the prior U. S. and foreign patents in the specialized field of inventions which he covers, and technical literature which he himself adds to the files from time to time to supplement this patent literature. The public search room of the Patent Office duplicates the Examiners' search files of U. S. patents.

Dr. John N. Street, F.A.I.C., has been named vice president in charge of research of The Firestone Tire & Rubber Co., Akron 17, Ohio. He joined Firestone in 1926 as research chemist.

Dr. Glenn T. Seaborg, Hon. AIC, announces that Dr. Hans A. Bethe will receive the U. S. Atomic Energy Commission's Enrico Fermi Award for 1961, for his contributions to nuclear and theoretical physics.

The Patent Office as an Information Center

The Hon. Maurice A. Crews

Assistant Commissioner of Patents, U. S. Patent Office,
Department of Commerce, Washington, D.C.

(A condensation of remarks made following the tour of the Patent Office held during the 38th Annual AIC Meeting, May 11, 1961).

WE in the Patent Office are proud of our contributions to technical literature and believe our resources should be known and used more widely by technically educated people. The patent system holds out the opportunity of reward to anyone capable of inventing a useful innovation in any field. As the consequence of the pull created by this hope of reward, over 3,000,000 patents have been issued. They describe the successive stages of advance in every field, in a degree of detail that will not be found in any other form. The question may be asked, of what use are three-million patents laid end to end in numerical order? The answer is in our examination system. The Patent Office requires, in determining the novelty of applications, a system of organization of patents by subject matter to match the scope of the information contained in the patents. This system is also available to you.

Each Patent Office examiner has, close to his desk, the patents in the subject matter fields which he examines. To make our search task feasible, we have had an intensive job of classification and reclassification of patents underway continuously since 1898. About 1000 man-years of professional time have been spent setting up the classifications system and assigning the individual patents to classes and subclasses. Our system includes over 300 main classes and 57,000 subclasses. The *Manual of Classification* is the guide to these. It is the most refined bibliographic division of applied science in the world. The patents are provided in this subject matter arrangement in two places: in the Examining Divisions for our own use and in the Public Search Room for use by anyone who wants to know what has been done in any field.

Let us consider the meaning of this to the chemist or engineer. Two pamphlets provide information. One, *Patents and Inventions*, was published in 1959, and is a sort of how-to-do-it manual for a person who thinks he has conceived a patentable invention. It was reviewed in the *British Patent Examiner's Magazine* under the heading, "Leading the Inventor by the Hand." It sells for 15 cents. The other pamphlet, *How to Obtain Information from U. S. Patents*, is a Jan. 1961 draft. It carries no price tag but we use it as a correspondence enclosure.

How does one proceed in keeping himself currently informed of the

teachings of the new patents as they are issued weekly? It is less time-consuming than you may have assumed. It is done by referring to a few selected pages of the *Patent Office Official Gazette*, which publishes abstracts, in the form of selected claims, of each of the 1000 or so patents issued every Tuesday. The key to time economy in the use of the *Gazette* lies in the way it is arranged. In the issue of May 2, 1961, for example, the General and Mechanical section comes first and covers 182 pages; the Chemical section covers 39 pages; and the Electrical section comes last and covers 46 pages.

Not only are the chemical patent disclosures separated from the mechanical, but they are arranged according to the subject matter classification, in ascending order of their class and subclass numbers. Thus, the first chemical patent in this issue is Merian, 2,982,596, and this patent is not only the lowest numbered chemical patent, but also the lowest in class and subclass number: class 8, subclass 57. The next is in class 8, subclass 59, and the next class 18, subclass 54. The class and subclass numbers are under the headings. Anyone interested in the new patent disclosures on synthetic resins from polymerized unsaturated compounds and knowing, from the index and schedules of the classification manual, that they are in subclasses 80 through 94.9 of class 260, can thumb through rapidly until he comes to the proper pages. He will find four patents issued in these subclasses on May 2. By reading this page 225, he can decide whether he wants to invest 25 cents for a full patent copy. The chemist need not know the classification book, he can learn from the *Official Gazette* itself what classes include the patents in his field.

I do not want to oversimplify any part of our subject. There are pitfalls and difficulties. I do want to point out what Dr. Mellon of Purdue University pointed out to his television chemistry class on Continental Classroom, when he said:

Various industrial men tell me that above all other things they look upon patents as the publications which mark the advancing forefront of chemical industry. They are extremely alert to them. They keep a standing order for certain classes of compounds for their particular interest, in the Patent Office. Just as soon as they are issued these are mailed out to them . . .

Finally, under patents I must call your attention to this journal, namely the *Official Gazette* of the Patent Office. If I had to name one publication which from sheer interest stands out above all others to me it would be this . . .

The *Official Gazette* is also used by chemists in a different manner. In each issue there is an index, the "List of Patentees." This provides a listing of newly-issued patents under the names of the inventors and the companies to which they are assigned. So the chemist, after going through

THE PATENT OFFICE . . .

the abstracts in the subject fields of interest, makes a check of the List of Patentees index, to see what patents have been issued in the names of companies and individuals whose work interests him.

The Patent Office also provides this kind of information on a yearly basis. In the annual *Index of Patents* for the year 1960, for example, we have a list of patentees covering 1020 pages, and a consecutive listing under class and subclass numbers of the patent numbers of every patent issued during the year. Having obtained lists of the patent numbers, the chemist would look them up in the *Official Gazette* or library patent copies for detailed information . . .

There is another point which chemists find to be valuable in obtaining information from recent patents. Since 1947, the Patent Office has published at the end of every patent a list of all of the prior patents and technical literature citations to which the Examiner has referred in the official correspondence leading up to the issuance of the patent. By ordering a copy of any patent issued since 1947, the inventor receives not only the detailed information about the invention, but also the list of this earlier material which the Examiner considered to be close enough to the subject matter patented to justify citing it in his official actions. The chemist who wants still further background on the invention may, therefore, by inspecting these patent and literature citations, learn a great deal from these earlier and related disclosures.

The chemist interested in certain individual patents can do still more. Patent applications are kept in strict confidence by the Patent Office while they are pending. But, once the patent is issued, the application and the entire prosecution record are open for inspection. You may inspect them in Washington or order copies to be sent to you. We have no secrets about our issued patents, and these prosecution records often contain information of direct value to you. The patent literature provides a treasure house of information for the technically educated person who is willing to use it. Chemists and engineers who know how to use the official search files of the Patent Office find it to be an exceptionally valuable source of information and stimulation. Dr. A. A. Kucher, vice president in charge of engineering and research, Ford Motor Company, has said:

There is no better way to catch up with the procession than to know the patent art. At the same time the study of an art through patents provides the best incubator for the conception of new and improved ways and means.

In the Public Search Room, any person interested in following through patents the development of any of the 57,000 strands of subject matter

covered by the official classification may do this by pulling the subclass bundles from the stacks, bringing them to a desk, and paging through them in the same order as the chronological development of technology in the field of search . . . It is a highly useful experience from the standpoint of education and for the stimulation to invention that it provides. This approach to progress is the heart and soul of the patent system.

What about those who cannot spend the time and money to come all the way to Washington to make this kind of review—those who are in St. Louis, Omaha, Seattle or Los Angeles? We do not have an answer to that question that is reasonably satisfactory. But we do have a partial answer. In the pamphlet, *How to Obtain Information from U. S. Patents*, we describe not only techniques for use of our Search Room, but also techniques for accomplishing in over 300 places very much the same thing. There are 21 libraries scattered all the way between Los Angeles and Boston which have sets of patents in bound books in numerical arrangements. These libraries are listed at the back of the pamphlet, and also on page 2 of the leaflet, *Obtaining Information from Patents*.

For some years the Patent Office has provided, in response to individual orders, lists of patent numbers in any desired classes and subclasses. These lists have been produced by punch cards and are within a few weeks of being fully up to date. The person who wants to find out if his invention is really new, or to follow the teachings of patents in any subject matter field, may write to the Patent Office, obtain machine written copies of lists of patent numbers in any special field, and then review the individual patents in one of these libraries. The cost of the subclass lists is 30 cents per page of patent numbers.

While the difficulty and delay in first finding out the classes and subclasses to be covered, then writing to Washington, and then pulling the volumes from the shelves to review individual patent disclosures, are quite serious, they have been of sufficient value to independent inventors to be used extensively. An average of 700 people per month were using the search services in the Chicago Public Library, two years ago; more recently over 1000 a week used those of the Los Angeles Public Library. In addition to the 21 libraries which have patent copies, over 300 have on their shelves sets of the *Official Gazette*. Since this has been published since 1872, the reader armed with a list of patents in subclasses can also use these *Official Gazette* volumes for his review, and order from the Patent Office in Washington, the patents which he finds to be of special interest.

The delay which occurs between the time the searcher has the desire to search and the time he is able to get the subclass lists involves impediments which are highly undesirable. For this reason, on Feb. 6, 1960, we made a breakthrough in the direction of making libraries in various parts of the country self-contained in their U. S. Patent information. We published on 11 microfilm reels the patent numbers under each of our 57,000 subclasses, both in the original and cross reference classification of patents as they are organized in our Patent Office Search files. These reels contain nothing but numbers, the numbers of the classes and subclasses, and under these the patent numbers themselves—6 million patent numbers. They are for sale by the Photo Duplication Services of the Library of Congress for \$55.00 for the complete set. They have been purchased for use by the public in 17 of the 21 libraries, and also in 20 of the libraries which have the *Official Gazette*, but not the full patent copies, and by many corporations, law firms, and others.

A person going into one of these libraries can now refer to the subclass lists, obtain from the reels the numbers of the patents in the subclasses to be reviewed, and proceed immediately with the task of looking up the individual patents in the *Official Gazette* or in the printed patent copy volumes, without the need to write to Washington for the lists. The Los Angeles Public Library has an especially fine arrangement, including copies on 3 microfilm reels of the definitions of the subclasses, and also a reader-printer with which a copy of a selected page of definitions or subclass numbers can be produced in 5 seconds.

There is another technique available in these libraries. It is not necessary for a searcher to obtain a subclass list or the microfilm reels to do a fairly substantial amount of browsing. He can accomplish this from the *Annual Index* volumes. Or if he has made his search through patent lists on the microfilm reels or through the special subclass lists obtained from Washington, he can bring it up to date by use of the *Annual Index* and the *Official Gazette*; or he can make a search with these aids, but it will be subject to certain definite dangers as to adequacy, since changes in Patent Office classification make it hazardous for the search to rely upon class and subclass information published in the *Gazette* or *Annual Index* some years earlier.

The Los Angeles arrangement, and that in a number of the other patent copy libraries, is as convenient for searching technology through patents as is the *Chemical Abstract* system in the chemical periodical field. Perhaps the Los Angeles system is even somewhat superior, but it is still

in the horse and buggy age compared to the system that we have available in Washington. No patent attorney or agent, familiar with the methods of sequential searching which we have here, would think of spending his time professionally in making a search with the best system we have in one of these numerical patent copy libraries.

Plans For Improvement

We have a number of ideas which might improve our public usefulness. One is illustrated by the pamphlets referred to above. We would like to publicize and explain our function and the benefits that people can attain if they know about our services. In this you can help us. Our second hope relates to the services themselves, and here, too, we need useful suggestions and constructive criticism. One of the most vital aspects of our patent system involves the public revelation of the details of the invention. This feature received impetus in 1869 when we started printing the patents, and in 1872 when we started publishing the *Official Gazette*.

Future historians of the patent system will find it strange that the opportunity for convenient review of patents by subject matter has been available until the 1960's only to those who can conveniently come to Washington. The teachings of patents are intended for persons skilled in the arts to which they pertain, not just for the patent profession. We do not feel that we have any special mission to act as intermediaries in dissemination to the public of the technical teachings of patents as distinguished from their legal significance. We feel that the patented art, arranged through time by subject matter, should be made available at a number of locations, if this can be accomplished with reasonable efficiency and economy.

The question is, "How do we do it?" If we should try to duplicate the Patent Office Search Room in full printed copies, even in a few locations, this would be enormously expensive in terms of space, personnel, buildings and equipment. We believe that a more economical type of installation can be established and be almost as useful—studies have indicated that it can be achieved on microfilm at each of the 21 locations which now have the patents only in numerical order, at an expense not much greater than that which would provide a printed copy search room in a single location. The time may be ripe to start a pilot plant installation. Such an experiment would likely use the microfilm in reel form. There are some difficult problems, such as how to keep the microfilm sets up to date; how to keep our latest Patent Office classification information available at the

search centers: liaison between Patent Office personnel and search center library people; how to prevent the operation from becoming a boondoggle, etc. We do not know how many people would use such a facility and no market survey could provide this information, since no such facility now exists, and the people canvassed would not know what we were talking about without an elaborate explanation. But we are convinced that we can do a great deal in the national interest in stimulating useful innovation, if we can accomplish this change and make available the teachings of patents in the same arrangement as we have them in our Public Search Room.

Dr. John H. Nair, F.A.I.C., consultant, Summit, N. J., was recently elected a trustee of Beloit College, Beloit, Wisconsin.

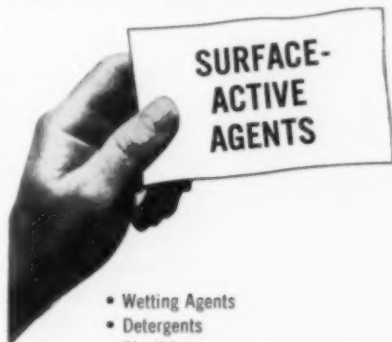
Dr. Walter S. Guthmann, F.A.I.C., of Chicago, Ill., has been named vice chairman of the Education Activities Committee of the Manufacturing Chemists' Association.

The Association of Industrial Advertisers sponsored a Middle Atlantic Industrial Advertising Conference, with the theme, "How to Communicate," in New York, N. Y., on April 12. **W. H. Trotter, F.A.I.C.**, is chairman of the National Projects Committee of the AIA.

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The Debate on Government Patent Rights

Subject

Should the Federal Government have proprietary rights in and title to patents originating in R & D contracts financed by Federal agencies?

Participants

The Hon. Senator Russell B. Long (Louisiana) chairman of the Monopoly Subcommittee of the Senate Select Committee on Small Business, and Dr. Roger H. Lueck, F.A.I.C., vice president for research, American Can Company, New York, N. Y.

Moderator

Dean Arthur E. Burns, Dean of the Graduate Council and Professor of Economics, George Washington University, Washington, D.C.

Excerpts from Remarks by Senator Long

FOR almost two years, the Monopoly Subcommittee of our Small Business Committee has been studying the patent policies of the departments and agencies of the Federal Government and the effect of these policies on the rate of growth of our economy and on the competitive free-enterprise system. I have been the chairman and only senator present at the hearings. Our conclusions show that Government should . . . retain the patent rights on Government-sponsored research.

Extent of Total and Government Research & Development

During 1959, \$7.9 billion of a total of \$13.2 billion or 60 per cent of all R & D performed by industry was financed by the Federal Government through R & D and procurement contracts. Of this \$6 billion was spent by the Defense Department. In 1957, of all R & D conducted in the aircraft industry, 85% was paid for by the Government. In the electrical equipment industry the Government paid for 61% of all research; in electronics, 54%; in fabricated metal products, 38%; machinery (except electrical), 38%; scientific instruments, 30%; petroleum refining & extraction, 4%.

Interrelationship of research for defense purposes and for civilian uses. Advantages of Government R & D contracts.

We should recognize the close interrelationship of research for defense purposes and for civilian uses. Industrial research has produced items invaluable for use in the defense establishment. Equally, defense research has resulted in the creation of products and the accumulation of technology with highly profitable commercial application. Processed foods, electronic devices, and penicillin, to list only a few commercial products, were all originally developed under R & D programs for defense purposes.

THE DEBATE . . .

The disproportionate share of total industrial R & D in the largest firms foreshadows a greater concentration of economic power in the future, for the benefits derived from Government-financed research, in addition to the profits (over 90% of R & D contracts, in dollar terms, were on a cost plus fixed fee basis so there were no risks involved) resulting from the performance of R & D and procurement contracts, are literally incalculable . . . Firms doing research for the Government in addition to enlarging their capacities from practical experience to use advanced knowledge, get an additional pay-off from the by-products of specific research, in the form of technical know-how, for example, in the development of less expensive production methods. Such "scientific capital" may be acquired wholly or in part at Government expense. An important competitive advantage thus accrues to the contractor.

Government Patent Policies

There is no one Government patent policy. Various Federal agencies and departments have sharply varying policies with regard to taking title to patentable inventions made under R & D contracts with private organizations. The law requires that the Government take title to all inventions resulting from Government-financed research, as in the case of the AEC, NASA, and the Department of Agriculture. Congress created this policy by statute. Other policies go to the extreme of automatically giving away all commercial rights to the firm doing research, as in the case of the Department of Defense, the Post Office Department and the National Science Foundation . . . For a private concern to make large profits is certainly within the concept of our American ideals. It is certainly NOT within the concept of our ideals for the Government deliberately to create and finance a monopoly so that the public will have to pay higher prices and willing businessmen will be excluded from profitable industries.

Some of the policies that give away the commercial rights were the result of extreme pressure put on the Government at times of national emergency. During World War II, the Office of Scientific Research & Development, at first used a contract which gave to the Government the title to discoveries resulting from public funds. But business firms in many cases, refused to perform research vital to our defense effort unless they got all rights to the work they did, even though the Government paid for it. So the OSR & D started using the contract which gave all commercial rights to the contractors in the war effort. This amounted to the Government's granting some firms a monopoly in certain fields. No previous patents were involved at all.

Standards of Judgment

Patent policies should be judged desirable or undesirable by the following questions:

- i. Does the policy tend to accelerate the rate of scientific achievement?
- ii. Does the policy encourage economic growth? Does it promote efficiency in the economic system, providing the consumer with the goods and services he requires at the lowest possible prices?
- iii. Does the policy tend to promote and maintain a competitive society? Or does it tend to promote monopoly, setting up a system of private control?
- iv. Does the policy promote social and economic justice?

Review of Policies

A. Patent Policy, Scientific Progress, Economic Efficiency and Growth:

The argument that a patent monopoly is necessary to bring about the production of civilian products is contrary to the facts. An examination of the industrial sector of our economy shows that food and beverage processing, tobacco and furniture manufacture, transportation, housing, automobiles, and those commodities which make up the largest part of consumers' expenditures, lie outside the patent field . . . If there is a demand for a product, businessmen will produce it—patent or no patent. The lack of exclusive rights has not discouraged the entry of firms into color film processing.

The argument that putting an invention into the public domain will discourage investment and hence exploitation of Government-sponsored inventions is an extension of the previous argument and is even less in accord with reality. An examination of the records of the TVA, the DA, the Department of Health, Education & Welfare, will disclose that businesses do take licenses and produce items for the civilian market even though there are no exclusive commercial rights. A good example is the patent on the development of frozen orange juice concentrate which was developed cooperatively with the DA and the Florida Citrus Commission at a cost to each of about \$70,000. This development has returned to the farmer, in the 1958-59 season alone, around \$120 million for oranges that are now processed in frozen orange concentrate. The Aerosol bomb is another good example of a publicly-developed and owned invention which has been put to great use by industry.

Allowing private firms to keep patent rights gives no assurance that an invention will be exploited. The biggest companies, those that get over

96% of Government R & D dollars, have used or are about to use only 50.6% of all the patents held by them. The corresponding figure for smaller companies, which get less than 4% of Government R & D dollars is 75.5%. All concrete specific evidence leads to these conclusions:

(1) It is not necessary to give exclusive commercial rights to one firm to insure that a particular item is offered to the public; and (2) that dedicating an invention to the public does not by any means discourage investment.

The argument that the rate of growth will be retarded if the Government takes title to Government-sponsored inventions, is a conclusion flowing from the previous two arguments, which have been shown to be without merit. The effect will be just the opposite; the rate of growth of our national output and of our scientific achievement can actually be accelerated by adopting the patent policies similar to those of the AEC for all Government agencies. The diffusion of scientific knowledge throughout our society is a prerequisite for scientific and economic progress and a rise in general productivity. Is scientific information readily available to all sectors of our economy at present? The American Society of Mechanical Engineers does not think so. They have become so alarmed at the lag in applying science that they have started a major study of the problem . . .

Policies that give away commercial rights to Government-financed inventions put the Government into a position of offering commercial incentives for putting more resources into applied scientific research as against basic scientific research. Second, the policy of giving away to private firms the patent rights to Government-financed inventions and discoveries tends to erect walls between scientists and to prevent a free interchange of information. Such contracts would provide incentives to industry to withhold scientific and technical knowledge . . . It is estimated that from 30-85% of valuable scientific time is wasted because of duplication of effort. A large part of this can be ascribed to the tendency of private enterprise to withhold scientific and technological data until they can be exploited or patented.

Let us examine the argument that if exclusive commercial rights are not given to the contractor, the cost of the contract to the government would increase and some firms would be reluctant to take the contracts. Whether the cost of R & D contracts would increase is difficult to say . . . There is no place to add such an additional consideration into the cost part of the contract and it would not affect the fixed fee. And the tremendous advantages of Government R & D contracts cannot be ignored. What

would be the alternative for a company like Aerojet, for example, whose business is 100% with the Government? But even if there is an increase in costs, we should be prepared to pay it. The cost of giving commercial rights to the contractor might not show up in the cost of Government expenditures on R & D but it would show up in the cost of the lower rate of diffusion of inventions and the higher prices associated with exclusive commercial rights.

Finally, we should not forget the cost to the public resulting from well-known past abuses of the patent privileges both in terms of growth and national defense. Many of the firms who have been guilty of the worst kind of patent abuses in the past are now among the most favored major Government R & D contractors. The granting of patent rights by the Government to these firms would continue to expose the public to the various potential abuses without providing us with any compensating advantages.

Now, about the argument that some firms would be reluctant to take a Government R & D contract? The important point is that there are competent firms willing to do the work. To this the DA, the DHE & W, the AEC and the NASA have testified. The more greedy and less patriotic firms will get in line when they discover that others will take their place.

There is another point: When the scientist takes his job for the contractor, he agrees to turn over all proprietary rights resulting from his work to his employer. If the contractor hires sub-contractors, the company will itself require that the subcontractors must turn proprietary rights over to the prime contractor. Inasmuch as the prime contractor is himself an employee of the Government, what justification could he have in objecting to the same conditions of employment which he requires of all those who work for him? Patent rights and other proprietary rights to "know-how" resulting from the Government contract should reside in the Government which pays the bills. This is not an attack upon the private patent system which exists in favor of persons who do their own inventing at their own expense. The policy I advocate is merely that the Government, in dealing with private corporations, should conduct itself in much the same fashion as those corporations would act if they were in the position of the Government dealing for their own account.

A sensible policy for the results of Government-financed research should have as its aims:

(1) The maintenance and strengthening of our free, competitive enterprise system by making the results of Government research open to

all our citizens instead of just a favored few;

(2) The acceleration of our rate of economic and scientific growth by insuring the most rapid dissemination of new scientific and technical knowledge secured with Government funds;

(3) And the elimination of immoral and undemocratic practices such as public taxation for private privilege.

Excerpts from the Remarks by Dr. Lueck, F.A.I.C.

WE are all acquainted with the two common forms of property, real and personal, and have established laws for their protection to the title holder. We must recognize, however, a third form of property; that is intellectual property, the property of the mind. The common law is applicable to intellectual property in that someone who steals it when it is being held secret is subject to civil prosecution. The difficulty of the common law, as it applies to intellectual property, is that protection ceases once property is published, sold, or otherwise disclosed to the public. Thereafter it is free to the world.

Let us examine these facts from the viewpoint of our forefathers at the time they were framing the greatest political document of all time, the American Constitution. Their interest was to promote the arts and sciences, such being essential to the cultural, economic, and social growth of the nation. To do so the prompt and free disclosures of invention and other products of men's minds had to be encouraged. The problem was to encourage free and early disclosure and still provide protection to intellectual property.

The solution to the founder's problem is found in the Constitution, Article I, Section 8, 8th clause: "The Congress shall have the power . . . to promote the progress of science and useful arts, *by securing for limited times to authors and inventors* exclusive right to their respective writings and discoveries." Upon that clause are based our laws with respect to copyrights, and trade-marks. Everyone can agree that it has solved the problem of the founding fathers and has been a significant factor in establishing for every American a standard of living which he cannot find among his counterparts in any other nation. Any step that contravenes the intent of the patent laws negates the efforts of the framers of our Constitution and destroys a time-honored tenet of our system of free enterprise.

The Increase in the Percentage of Government Financing of the Nation's R & D Effort

What has generated the issue before us here is not the total expenditures for R & D but rather the rapidly increasing percentage of federal participation in financing the R & D effort. In 1959 government financed 60% of the total R & D. It probably went to 64% in 1960, and it is estimated that by 1970 the government will finance 80 to 85% of a total expenditure of \$27 to \$29 billion. By contrast, in 1953, government participation was only 37%. To what is this situation attributable? Partially, it is due to the cancerous proliferation of bureaucracy that, unfortunately, has spawned a vast amount of federal research in areas that are peculiarly the responsibility of industry in a free enterprise system.

The Federal Agencies' Goals in R & D Contracts

In seeking R & D contracts the federal agency's sole concern has been the acquisition of know-how necessary for it to complete its missions. It has sought only the free and unfettered use of the developed know-how for government use only. It has received exactly what it sought and paid for in the form of patents. In no case has the agency had concern for the strictly commercial applications for the know-how or patents within the civilian economy. That is as it should be.

The Position of the Industrial Laboratory in Government R & D Contracts

Anyone with experience in government R & D contracting knows that the reason a federal agency negotiates with a particular contractor is because that contractor knows the field, has a background of development in it, has talents, and an established body of knowledge accumulated through his efforts and with his own financial resources. In the Space Subcommittee report on the NASA bill in the 86th Congress it was conceded that when the government moved into the missile area on a crash basis, it benefited from a rich and deep background of privately financed research and development.

The usual government R & D contract provides no return whatsoever for the competency which represents a major part of the contractor's investment in research. It compensates only for the costs actually incurred during the contract period with no reference back to the already established position of the company and its competency in the particular fields of development involved. Yet the contribution flowing from this to the success of the contract is substantial.

The principal objective facing the management of an industrial enterprise is that of producing a profit. Management must utilize its huge

investment in research to produce the maximum return. Any R & D administrator who does not orient his company's private research program to projects possessing profit potential far in excess of the 6% allowed in a government contract is guilty of mismanagement and will probably get the ax. How, then, can he justify to corporate management the acceptance of a government R & D contract when the research and development *per se* will net something less than 6%? He can do it only when the following incentives are provided:

1. The contract places the company in a preferred position to produce the government's requirements of hardware that are developed in the contract.
2. The contractor is left in a position that justifies the expenditures of private money necessary to exploit a patent in the civilian economy.
3. The contractor is left in a position to bargain with his competitors in a cross-licensing operation. Such is often necessary when one patent serves to block the application of a later one in the production of a civilian product or use of a process. If patent title does not remain with the contractor, there can be no negotiation.
4. The contractor is left free to meet foreign competition. If foreign competition has patents granted by the U. S. and the contractor is deprived of his, he can be excluded from the American as well as the foreign market.

These conditions cannot be met under a statutory title policy, and hence industry cannot afford by and large to accept R & D contracts.

License Policy is Essential to Effective R & D Contracting

The Department of Defense discovered long ago that to secure acceptance of its R & D contracts by industry and even university laboratories it had to adopt the license policy whereunder title to the patent remains with the contractor. Early in World War II it offered its short form of contract embodying the title policy requiring assignment of patent title to the government. It did not work. Even under the patriotic stimulus of a hot war, industry was reluctant to accept its terms. Consequently, DOD developed the long form of contract incorporating the license policy, and for the good of the country has adhered to it ever since . . . The bare facts of the matter are that title policy has not worked and will not work, and any act to make it mandatory in federally financed R & D contracts is a step in the wrong direction.

License Policy is Essential to the Nation's Defense Effort

The preparations for defense of the country are in a large measure dependent on the R & D programs of DOD. They will be seriously impaired if DOD is required to adopt the title clause in its R & D contracts and thereby force industrial laboratories into a position where they cannot entertain DOD contracts. These statements are verified in the testimony of Mr. G. C. Bannerman, deputy assistant secretary of defense, before the

April 18, 1961, hearings of the Subcommittee on Patents, Trademarks & Copyrights of the Senate Judiciary Committee on S-1084, a companion bill to S-1176. Mr. Bannerman also made clear that, under statutory title policy, the R & D programs of DOD would be immeasurably slowed and the cost increased, simply because DOD would no longer be able to negotiate R & D contracts with those organizations best fitted to perform by reason of the specialized skills and backgrounds acquired at their own expense for use in their own commercial pursuits. Quality would suffer and costs increase.

Title Policy Will Retard Advancement in the Arts and Sciences

Quite apart from the adverse effect of the title policy on the defense effort, it will in some degree retard the advance in the arts and sciences and deprive the public of the products and services stemming from new technology. It is one thing to research a subject sufficiently to produce a patent; it is quite another to develop the knowledge exposed in a patent to a commercial product or process. Anyone familiar with R & D well knows that the manpower and dollars required for the latter far exceeds that required for the first. With the loss of profit incentive normally provided by the exclusive use granted by patent title, industry will be reluctant to expend the monies required to develop, produce, and introduce a product in the civilian market, and the public which enjoys better living through the new products of industry will be the loser. Vesting of title in the government can serve only to render sterile the value of a patent to the civilian economy.

License Policy Does Not Engender Economic Concentration in Big Business

Small business, always a subject upon which one can make a strong emotional appeal, has been used as a prop by the supporters of title policy. Their contention is that since 94% of the research performed in industrial laboratories is carried out in the laboratories of companies with over 1000 employees, it is only big business that stands to gain from federally supported research under a license policy. Viewed superficially, this would seem to be the case, but under sub-surface scrutiny the contention does not hold water . . .

As a matter of fact, the ownership of patents resulting from federal contracts is usually of minor significance in relation to the total inventive background of a large company. It is quite different with the small creative company which must depend on patent protection for existence in its field

THE DEBATE . . .

of endeavor. A small company can utilize its development as an offset against the advantages held by larger companies. Perhaps the strongest advocates of license policy have been the little research organizations.

This point is clearly stated in a letter sent to Senator Long on Dec. 30, 1959, by Dr. J. Bjorksten, president, Bjorksten Research Labs., Inc., in which he noted that his organization (employing less than 100 persons) had, over the years, devoted about half of its manpower to defense research. He pointed out the various difficulties of small companies such as his in dealing with the intricate engineering, fiscal and other requirements of the government, and stated:

Under such circumstances the only fact that justifies our doing business for the Government on research, aside from a desire to be of help, is the rather remote possibility of obtaining a profitable patent situation. If the Government were to retain all the patent rights on defense contracts we could no longer justify bidding for any Government defense work."

It will be the small company which suffers should title policy become mandatory on all agencies.

The Cost of Research to the Private Citizen

The adherents to the title policy maintain that under the license policy the taxpayer is forced to pay twice for the same R & D work; once, when the federal agency pays the contractor's bill for the work performed under the contract; and the second time, when the results of the research find expression in some civilian product produced by the contractor and sold through normal channels. This reasoning overlooks some basic economic facts. In the end, the purchaser of the Gross National Product (you and I) pay for all of the research and development done in the laboratories of industry, even that where the effort is unsuccessful. If the research is privately supported by industry, the cost becomes a part of the selling price until it is amortized and the selling price decreased. It has to be that way in a capitalistic system. If the necessary research is supported by government, we pay for it in our tax bill and the initial selling price of the civilian product is correspondingly lower. The ultimate cost of research to the taxpayer remains the same, irrespective of the channel through which it is paid.

The reference by Senator Long to frozen orange juice concentrate comes close to my own experience. I am acquainted with this development, but its success does not come from the Government patent, which is used by only a few producers, but from the development of the high-capacity, high-vacuum pump, which was invented by an industrial firm with private funds.

A Comment on the Debate

Clarence Blomp

New York, N. Y.

(Because of the room arrangements where the Debate between Senator Long and Dr. Lueck was held, there was insufficient time at the conclusion of the Debate for either rebuttal or for discussion from the floor. This comment would have been given during discussion, had time permitted.)

I CAME to this debate with an open mind and I left it still undecided. But I would have liked to have asked Senator Long whether he wants to exclude industrial firms generally from government contract work on research, and reserve this largely for academic institutions, as is done, by the National Institutes of Health, or whether his concern only relates to whether the industrial firms should be paid by means other than patent rights—so as to enable them to do this work on a financially acceptable basis. In competition strictly on a dollar basis, the universities and non-profit institutions will always be able to underbid industrial firms and individuals because of their endowments, public support, and freedom from taxes, and low cost student workers. Or would he approve incentives other than patents to non-academic, tax paying researchers to keep these in the effort and maintain the balanced team of industrial and academic researchers, which in the past has achieved the best breakthroughs?

I would have asked Dr. Lueck if he realized that the critical thing in a research contract is the slow turnover time. If a grocer makes 7% profit on the goods he sells, he will expect to turn it over 4-6 times yearly, thus making 28-42% per year. But a research contract almost invariably runs on a yearly basis. Thus only 7% per year is realized as theoretical maximum. Practically, at least half of that percentage is lost through various deductions so that the research contractor ends up with 2-3% per year before taxes. A firm operating on such slender yearly margins is unable to build reserves and will be wiped out by even a small reverse.

Senator Long said that a firm working on a "Cost-plus contract" takes no risk. But there are several ways in which a firm or an inventor can lose money on a "cost plus fixed fee contract." The most obvious is the device of the limited overhead. Example: A small firm has two government contracts of \$100,000 each. It negotiates a third contract also for \$100,000. The Contracting Officer insists on an overhead limitation of 160% maximum; otherwise he will not award the contract. This seems safe enough to the little company, for its current overhead rate is 125%, and with the

A COMMENT . . .

new contract this will go down to 110%. Half a year later the two old contracts are cancelled or expire and nothing new takes their place. All of the administrative, maintenance, and equipment expense is thrown on the remaining contract and the overhead rate soars to 300%. By laying off 30% of the administrative staff, this is cut to 240%; to cut further would destroy the organization and kill the sales effort which just then is most essential to break out from this tailspin. Thus the overhead limitation on the "cost plus fixed fee contract" has become a trap, giving the small firm the unenviable choice of either going out of business or operating at an 80% loss for an indefinite time—all on a supposedly safe, cost plus fixed fee contract.

Another quite common cause for losses on such contracts is the following: A small firm has a "cost plus fixed fee contract" which runs out. Results have been fine, renewal is promised, but government administrative delays postpone this renewal. The contractor now has the choice: (1) lay off the scientific specialists who worked on the contract, and for whom no other work can be arranged, and who would be most difficult to replace; (2) carry this personnel at his own expense pending the promised renewal. To do the former might destroy his competence in a critical field and lose valuable personnel; to do the latter will cause a direct loss, if for some reason the contract is not renewed or is not dated back to cover time between expiration and renewal date. Quite often the situation is such that a small firm is almost forced to gamble more than it should on a hedged promise of renewal which then does not come through.

What incentive should be offered to industrial firms if patent rights are not to be granted? It seems clear that the corporations who with their taxes help cover government expenses cannot otherwise compete with universities and academic institutions who have most of their overhead paid, are tax free, and too often pay workers with degrees rather than with cash. Since research corporations and individual inventors commonly pay 50% of their income in tax and have a business turnover rate of once a year only, it would appear entirely reasonable to consider an allowable profit rate similar to the 15-20% common on industrial research contracts, in lieu of patent rights. This may seem to some a high profit percentage, but it is actually less than say 5% on, for example, nuts or bolts, where the manufacturer can turn over his money and take his profit 4-6 times a year.

Do You Want to Retain the Present Patent System?

(After hearing the lively debate on patents at the 38th AIC Annual Meeting, many of those present "debated" the subject in private discussions later. Dr. D. B. Keyes, F.A.I.C., has prepared the following questions so that every AIC member may contribute his opinion. If you are unfamiliar with the situation, read the papers and the debate on patents in this issue of THE CHEMIST.)

Though many of us are interested in preserving our present Patent System, I am told that some AIC members feel otherwise. I just can't believe this is true and to test this conclusion, I would like to ask a few "yes or no" questions:

	Yes	No
1. Are you employed by a "profit" organization?	_____	_____
2. Are you employed by a "non profit" group?	_____	_____
3. If the answer to question 2 is "yes," is the group supported by taxes?	_____	_____
4. Are you self-employed?	_____	_____
5. Do you have any patented invention now in commercial use?	_____	_____
6. Do you know of any <i>important</i> patented invention which has been "suppressed" by any manufacturing company?	_____	_____
7. Do you know of any invention which was commercially developed by the Federal government?	_____	_____
8. Do you know if the Government has at any time "defended" one of its own patents?	_____	_____
9. If the answer to question 8 is "No" are not these Government owned patents financially worthless?	_____	_____
10. Is the primary reason for a Government Research Contract to solve the specific problem as quickly as possible?	_____	_____
11. To solve important national problems, should we not obtain the best brains with background knowledge who are available?	_____	_____
12. Isn't private industry in the best position to commercially develop new products for the public?	_____	_____
13. Do you know of any one of the following important inventions that could have been commercially developed sooner without patent protection: Nylon, the Land Camera, Modern Gasoline, Antibiotics, Vitamins?	_____	_____

Note: You need not sign this questionnaire, but if you do I will send you a statistical summary. Please send your replies to:

D. B. Keyes
480 Park Ave.,
New York 22, N. Y.

Dr. James B. Allison, F.A.I.C., professor and director, Bureau of Biological Research, Rutgers University, New Brunswick, N. J., has been chosen president-elect of the Scientific Council of the New York Academy of Sciences, New York 21, N. Y.

Dr. Henry A. Hill, F.A.I.C., has been elected president of Riverside Research Lab., Inc., Cambridge 42, Mass.

The Crucible Steel Company of America, Pittsburgh, Pa., held a plant tour for members of the press, May 11, to demonstrate the first D-H vacuum treatment unit in America, and to discuss its importance to users of specialty steels. During the tour of the Midland, Pa., works, a 170-ton heat of open hearth steel was processed through the unit, which removes impurities.

Chemical Age, 154 Fleet St., London, EC 4, England, announces that Roger Williams Technical & Economic Services, Inc., of Princeton, N. J., has been appointed as its editorial correspondents in the U. S.

The 8th Annual National Meeting of the American Astronautical Society will be held Jan. 16-18, 1962, at the Sheraton-Park Hotel, Washington, D.C.

Food Machinery & Chemical Corporation has changed its name to FMC Corporation, as of July 1.

Technicon Controls, Inc., Chauncey, N. Y., recently demonstrated automated analyses by Kjeldahl techniques. One operator supervising two of the continuous automatic Digestor machines can produce 320 analyses per working day compared to an average of 40 analyses per operator day by manual methods. The new development makes possible monitoring of batch or continuous processes.

Chas. Pfizer & Co., Inc., New York 17, N. Y., will acquire Paul-Lewis Labs., Inc., of Milwaukee, Wisconsin.

The American Oil Chemists' Society will meet Oct. 30-Nov. 1, 1961, at the Pick-Congress Hotel, Chicago, Ill.



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